CLAIMS

1. A membrane electrode assembly comprising:

a cathode catalyst layer having a first set of edges;

an anode catalyst layer having a second set of edges; and

a solid polymer electrolyte provided between said cathode and anode catalyst layers, said solid polymer having an ionomer and a third set of edges, and said first set of edges of said cathode catalyst layer are closer in proximity than said second set of edges of said anode catalyst layer to said third set of edges of said electrolyte.

2. A device comprising a membrane electrode assembly wherein said membrane electrode assembly comprises:

a cathode catalyst layer having a first set of edges;

an anode catalyst layer having a second set of edges; and

a solid polymer electrolyte provided between said cathode and anode catalyst layers, said solid polymer having an ionomer and a third set of edges, wherein said anode catalyst layer has a surface area in contact with said ionomer which is less than a surface area of said cathode catalyst layer in contact with said ionomer, and said first set of edges of said cathode catalyst layer are closer in proximity than said second set of edges of said anode catalyst layer to said third set of edges of said electrolyte.

3. The device as recited by claim 2 wherein the total surface area of said anode catalyst layer is less than the total surface area of said cathode catalyst layer.

4. The device as recited by claim 2 further comprising a diffusion layer, wherein the surface area of said anode catalyst layer in contact with said ionomer is sized by a gasket interposed between said electrolyte and said diffusion layer.

5. The device as recited by claim 2 further comprising first and second diffusion layers, wherein the surface area wherein the surface areas of said catalyst layers in contact with said ionomer are sized by gaskets interposed between said electrolyte and said diffusion layers.

6. The device as recited by claim 2 wherein said cathode catalyst layer is provided to a first diffusion layer, and said anode catalyst layer provided to a second diffusion layer.

7. The device as recited by claim 2 wherein the surface area of the cathode catalyst layer ranges from about 730 cm^2 to about 805 cm^2 and the surface area of the anode catalyst layer ranges from about 700 cm^2 to about 770 cm^2.

8. The device as recited by claim 2 wherein a difference between the surface areas of the cathode and anode catalyst layers ranges from about 32 cm^2 to about 36 cm^2.

9. The device as recited by claim 2 wherein spacing of said first set of edges of said cathode catalyst layer and said second set of edges of said anode catalyst layer to said third set of edges of said electrolyte range from about 47 mm to about 58 mm.

10. The device as recited by claim 2 wherein the catalyst layers have thicknesses in the range of about 8 to about 10 microns.

11. The device as recited by claim 2 wherein the membrane electrode assembly has a thickness in the range of about 34 to about 41 microns.

12. The device as recited by claim 2 wherein said membrane electrode assembly is incorporated into a fuel cell comprising:

a first electrically conductive diffusion layer coupled to said cathode catalyst layer;

a second electrically conductive diffusion layer coupled to said anode catalyst layer provided to said second diffusion layer; and

a pair of electrically conductive flow field plates sandwiching therebetween said diffusion layers, said catalyst layers, and said solid polymer electrolyte.

13. The device as recited by claim 12 wherein the surface area of the cathode catalyst layer ranges from about 730 cm^2 to about 805 cm^2 and the surface area of the anode catalyst layer ranges from about 700 cm^2 to about 770 cm^2.

14. The device as recited by claim 12 wherein a difference between the surface areas of the cathode and anode catalyst layers ranges from about 32 cm^2 to about 36 cm^2.

15. The device as recited by claim 12 wherein said fuel cell is incorporated into a fuel cell system comprising:

a fuel storage system supplying a fuel comprising hydrogen;

a drive system;

an energy conversion component receiving and regulating generated electricity by the fuel cell system to control said drive system; and

an optional temporary energy storage for storing the generated electricity.

16. The device as recited by claim 15 wherein said fuel cell system further comprising a fuel processor for converting said fuel into a hydrogen rich stream for said fuel cell.

17. The device as recited by claim 15 wherein said device is an automobile.

18. The device as recited by claim 15 wherein said anode catalyst layer has a surface area less than a surface area of said cathode catalyst layer in contact with said solid polymer electrolyte, wherein the surface area of the cathode catalyst layer ranges from about 730 cm^2 to about 805 cm^2 and the surface area of the anode catalyst layer ranges from about 700 cm^2 to about 770 cm^2,

and wherein a difference between the surface areas of the cathode and anode catalyst layers ranges from about 32 cm^2 to about 36 cm^2.

19. A method of preparing a membrane electrode assembly comprising:

providing a solid polymer electrolyte having an ionomer, said solid polymer electrolyte having first and second surfaces;

providing a cathode catalyst layer to the first surface of said electrolyte; and

providing an anode catalyst layer to the second surface of said electrolyte such that a first set of edges of said cathode catalyst layer are closer than a second set of edges of said anode catalyst layer to a third set of edges of said electrolyte.

20. The method as recited by claim 19, wherein providing said anode catalyst layer results in a surface area of said anode catalyst layer in contact with said second surface of said electrolyte being less than a surface area of said cathode catalyst layer in contact with said first surface of said electrolyte.